

# SECTION 4

# NORMAL PROCEDURES

## TABLE OF CONTENTS

	Page
Introduction . . . . .	4-3
Speeds For Normal Operation . . . . .	4-3
<b>CHECKLIST PROCEDURES</b>	
Preflight Inspection . . . . .	4-5
Cabin . . . . .	4-5
Empennage . . . . .	4-5
Right Wing, Trailing Edge . . . . .	4-5
Right Wing . . . . .	4-5
Nose . . . . .	4-5
Left Wing . . . . .	4-6
Left Wing, Leading Edge . . . . .	4-6
Left Wing, Trailing Edge . . . . .	4-6
Before Starting Engine . . . . .	4-6
Starting Engine . . . . .	4-6
Before Takeoff . . . . .	4-7
Takeoff . . . . .	4-7
Normal Takeoff . . . . .	4-7
Short Field Takeoff . . . . .	4-8
Enroute Climb . . . . .	4-8
Cruise . . . . .	4-8
Descent . . . . .	4-8
Before Landing . . . . .	4-8
Landing . . . . .	4-9
Normal Landing . . . . .	4-9
Short Field Landing . . . . .	4-9
Balked Landing . . . . .	4-9
After Landing . . . . .	4-9
Securing Airplane . . . . .	4-9

## AMPLIFIED PROCEDURES

Starting Engine . . . . .	4-11
---------------------------	------

## TABLE OF CONTENTS (Continued)

	Page
Taxiing . . . . .	4-11
Before Takeoff . . . . .	4-13
Warm-Up . . . . .	4-13
Magneto Check . . . . .	4-13
Alternator Check . . . . .	4-13
Takeoff . . . . .	4-13
Power Check . . . . .	4-13
Wing Flap Settings . . . . .	4-14
Short Field Takeoff . . . . .	4-14
Crosswind Takeoff . . . . .	4-15
Enroute Climb . . . . .	4-15
Cruise . . . . .	4-15
Stalls . . . . .	4-17
Spins . . . . .	4-17
Landing . . . . .	4-19
Normal Landing . . . . .	4-19
Short Field Landing . . . . .	4-20
Crosswind Landing . . . . .	4-20
Balked Landing . . . . .	4-20
Cold Weather Operation . . . . .	4-20
Starting . . . . .	4-20
Flight Operations . . . . .	4-22
Hot Weather Operation . . . . .	4-23
Noise Abatement . . . . .	4-23

## INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with Optional Systems can be found in Section 9.

## SPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum weight of 2300 pounds and may be used for any lesser weight. However, to achieve the performance specified in Section 5 for takeoff distance, the speed appropriate to the particular weight must be used.

### Takeoff, Flaps Up:

Normal Climb Out . . . . .	70-80 KIAS
Short Field Takeoff, Flaps Up, Speed at 50 Feet . . . . .	59 KIAS

### Enroute Climb, Flaps Up:

Normal, Sea Level . . . . .	75-85 KIAS
Normal, 10,000 Feet . . . . .	70-80 KIAS
Best Rate of Climb, Sea Level . . . . .	73 KIAS
Best Rate of Climb, 10,000 Feet . . . . .	68 KIAS
Best Angle of Climb, Sea Level . . . . .	59 KIAS
Best Angle of Climb, 10,000 Feet . . . . .	61 KIAS

### Landing Approach:

Normal Approach, Flaps Up . . . . .	60-70 KIAS
Normal Approach, Flaps 40° . . . . .	55-65 KIAS
Short Field Approach, Flaps 40° . . . . .	60 KIAS

### Balked Landing:

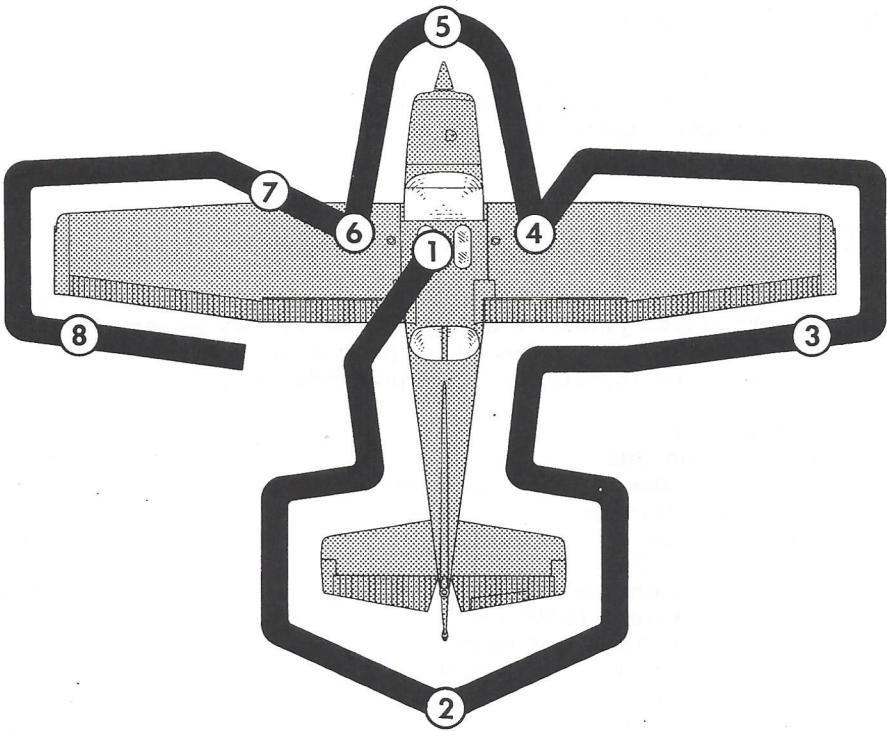
Maximum Power, Flaps 20° . . . . .	55 KIAS
------------------------------------	---------

### Maximum Recommended Turbulent Air Penetration Speed:

2300 Lbs . . . . .	97 KIAS
1950 Lbs . . . . .	89 KIAS
1600 Lbs . . . . .	80 KIAS

### Maximum Demonstrated Crosswind Velocity:

Takeoff or Landing . . . . .	15 KNOTS
------------------------------	----------



NOTE

Visually check airplane for general condition during walk-around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

Figure 4-1. Preflight Inspection

## CHECKLIST PROCEDURES

### PREFLIGHT INSPECTION

#### ① CABIN

- (1) Control Wheel Lock -- REMOVE.
- (2) Ignition Switch -- OFF.
- (3) Master Switch -- ON.
- (4) Fuel Quantity Indicators -- CHECK QUANTITY.
- (5) Master Switch -- OFF.
- (6) Baggage Door -- CHECK, lock with key if child's seat is to be occupied.

#### ② EMPENNAGE

- (1) Rudder Gust Lock -- REMOVE.
- (2) Tail Tie-Down -- DISCONNECT.
- (3) Control Surfaces -- CHECK freedom of movement and security.

#### ③ RIGHT WING Trailing Edge

- (1) Aileron -- CHECK freedom of movement and security.

#### ④ RIGHT WING

- (1) Wing Tie-Down -- DISCONNECT.
- (2) Main Wheel Tire -- CHECK for proper inflation.
- (3) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment, and proper fuel grade.
- (4) Fuel Quantity -- CHECK VISUALLY for desired level.
- (5) Fuel Filler Cap -- SECURE.

#### ⑤ NOSE

- (1) Engine Oil Level -- CHECK. Do not operate with less than four quarts. Fill to six quarts for extended flight.
- (2) Before first flight of the day and after each refueling, pull out strainer drain knob for about four seconds to clear fuel strainer of possible water and sediment. Check strainer drain closed. If water is observed, the fuel system may contain additional water, and further draining of the system at the strainer, fuel tank sumps, and

fuel selector valve drain plug will be necessary.

- (3) Propeller and Spinner -- CHECK for nicks and security.
- (4) Landing Light(s) -- CHECK for condition and cleanliness.
- (5) Carburetor Air Filter -- CHECK for restrictions by dust or other foreign matter.
- (6) Nose Wheel Strut and Tire -- CHECK for proper inflation.
- (7) Nose Tie-Down -- DISCONNECT.
- (8) Static Source Opening (left side of fuselage) -- CHECK for stoppage.

## ⑥ LEFT WING

- (1) Main Wheel Tire -- CHECK for proper inflation.
- (2) Before first flight of the day and after each refueling, use sampler cup and drain small quantity of fuel from fuel tank sump quick-drain valve to check for water, sediment and proper fuel grade.
- (3) Fuel Quantity -- CHECK VISUALLY for desired level.
- (4) Fuel Filler Cap -- SECURE.

## ⑦ LEFT WING Leading Edge

- (1) Pitot Tube Cover -- REMOVE and check opening for stoppage.
- (2) Fuel Tank Vent Opening -- CHECK for stoppage.
- (3) Stall Warning Opening -- CHECK for stoppage. To check the system, place a clean handkerchief over the vent opening and apply suction; a sound from the warning horn will confirm system operation.
- (4) Wing Tie-Down -- DISCONNECT.

## ⑧ LEFT WING Trailing Edge

- (1) Aileron -- CHECK for freedom of movement and security.

## BEFORE STARTING ENGINE

- (1) Preflight Inspection -- COMPLETE.
- (2) Seats, Belts, Shoulder Harnesses -- ADJUST and LOCK.
- (3) Fuel Selector Valve -- BOTH.
- (4) Radios, Autopilot, Electrical Equipment -- OFF.
- (5) Brakes -- TEST and SET.
- (6) Circuit Breakers -- CHECK IN.

## STARTING ENGINE

- (1) Mixture -- RICH.

- (2) Carburetor Heat -- COLD.
- (3) Master Switch -- ON.
- (4) Prime -- AS REQUIRED (2 to 6 strokes; none if engine is warm).
- (5) Throttle -- OPEN 1/8 INCH.
- (6) Propeller Area -- CLEAR.
- (7) Ignition Switch -- START (release when engine starts).
- (8) Oil Pressure -- CHECK.

## BEFORE TAKEOFF

- (1) Parking Brake -- SET.
- (2) Cabin Doors and Window(s) -- CLOSED and LOCKED.
- (3) Flight Controls -- FREE and CORRECT.
- (4) Flight Instruments -- SET.
- (5) Fuel Selector Valve -- BOTH.
- (6) Mixture -- RICH (below 3000 feet).
- (7) Elevator Trim and Rudder Trim (if installed) -- TAKEOFF.
- (8) Throttle -- 1700 RPM.
  - a. Magnetos -- CHECK (RPM drop should not exceed 125 RPM on either magneto or 50 RPM differential between magnetos).
  - b. Carburetor Heat -- CHECK (for RPM drop).
  - c. Engine Instruments and Ammeter -- CHECK.
  - d. Suction Gage -- CHECK.
- (9) Radios -- SET.
- (10) Autopilot (if installed) -- OFF.
- (11) Flashing Beacon, Navigation Lights and/or Strobe Lights -- ON as required.
- (12) Throttle Friction Lock -- ADJUST.
- (13) Brakes -- RELEASE.

## TAKEOFF

### NORMAL TAKEOFF

- (1) Wing Flaps -- UP.
- (2) Carburetor Heat -- COLD.
- (3) Throttle -- FULL OPEN.
- (4) Elevator Control -- LIFT NOSE WHEEL (at 55 KIAS).
- (5) Climb Speed -- 70-80 KIAS.

### SHORT FIELD TAKEOFF

- (1) Wing Flaps -- UP.
- (2) Carburetor Heat -- COLD.
- (3) Brakes -- APPLY.
- (4) Throttle -- FULL OPEN.
- (5) Mixture -- RICH (above 3000 feet, LEAN to obtain maximum RPM).
- (6) Brakes -- RELEASE.
- (7) Elevator Control -- SLIGHTLY TAIL LOW.
- (8) Climb Speed -- 59 KIAS (until all obstacles are cleared).

### ENROUTE CLIMB

- (1) Airspeed -- 70-85 KIAS.

#### NOTE

If a maximum performance climb is necessary, use speeds shown in the Rate Of Climb chart in Section 5.

- (2) Throttle -- FULL OPEN.
- (3) Mixture -- RICH (above 3000 feet, LEAN to obtain maximum RPM).

### CRUISE

- (1) Power -- 2200-2700 RPM (no more than 75% is recommended).
- (2) Elevator and Rudder Trim (if installed) -- ADJUST.
- (3) Mixture -- LEAN.

### DESCENT

- (1) Mixture -- ADJUST for smooth operation (full rich for idle power).
- (2) Power -- AS DESIRED.
- (3) Carburetor Heat -- AS REQUIRED (to prevent carburetor icing).

### BEFORE LANDING

- (1) Seats, Belts, Harnesses -- SECURE.
- (2) Fuel Selector Valve -- BOTH.



- (3) Mixture -- RICH.
- (4) Carburetor Heat -- ON (apply full heat before closing throttle).

## LANDING

### NORMAL LANDING

- (1) Airspeed -- 60-70 KIAS (flaps UP).
- (2) Wing Flaps -- AS DESIRED (below 85 KIAS).
- (3) Airspeed -- 55-65 KIAS (flaps DOWN).
- (4) Touchdown -- MAIN WHEELS FIRST.
- (5) Landing Roll -- LOWER NOSE WHEEL GENTLY.
- (6) Braking -- MINIMUM REQUIRED.

### SHORT FIELD LANDING

- (1) Airspeed -- 60-70 KIAS (flaps UP).
- (2) Wing Flaps -- FULL DOWN (40°).
- (3) Airspeed -- 60 KIAS (until flare).
- (4) Power -- REDUCE to idle after clearing obstacle.
- (5) Touchdown -- MAIN WHEELS FIRST.
- (6) Brakes -- APPLY HEAVILY.
- (7) Wing Flaps -- RETRACT.

### BALKED LANDING

- (1) Throttle -- FULL OPEN.
- (2) Carburetor Heat -- COLD.
- (3) Wing Flaps -- 20° (immediately).
- (4) Climb Speed -- 55 KIAS.
- (5) Wing Flaps -- 10° (until obstacles are cleared).  
RETRACT (after reaching a safe altitude and 60 KIAS).

## AFTER LANDING

- (1) Wing Flaps -- UP.
- (2) Carburetor Heat -- COLD.

## SECURING AIRPLANE

- (1) Parking Brake -- SET.
- (2) Radios, Electrical Equipment, Autopilot -- OFF.

**SECTION 4**  
**NORMAL PROCEDURES**

**CESSNA**  
**MODEL 172N**

- (3) Mixture -- IDLE CUT-OFF (pulled full out).
- (4) Ignition Switch -- OFF.
- (5) Master Switch -- OFF.
- (6) Control Lock -- INSTALL.

## AMPLIFIED PROCEDURES

### STARTING ENGINE

During engine starting, open the throttle approximately 1/8 inch. In warm temperatures, one or two strokes of the primer should be sufficient. In cold weather, up to six strokes of the primer may be necessary. If the engine is warm, no priming will be required. In extremely cold temperatures, it may be necessary to continue priming while cranking the engine.

Weak intermittent firing followed by puffs of black smoke from the exhaust stack indicate overpriming or flooding. Excess fuel can be cleared from the combustion chambers by the following procedure: Set the mixture control full lean and the throttle full open; then crank the engine through several revolutions with the starter. Repeat the starting procedure without any additional priming.

If the engine is underprimed (most likely in cold weather with a cold engine) it will not fire at all, and additional priming will be necessary. As soon as the cylinders begin to fire, open the throttle slightly to keep it running.

After starting, if the oil gage does not begin to show pressure within 30 seconds in the summertime and about twice that long in very cold weather, stop engine and investigate. Lack of oil pressure can cause serious engine damage. After starting, avoid the use of carburetor heat unless icing conditions prevail.

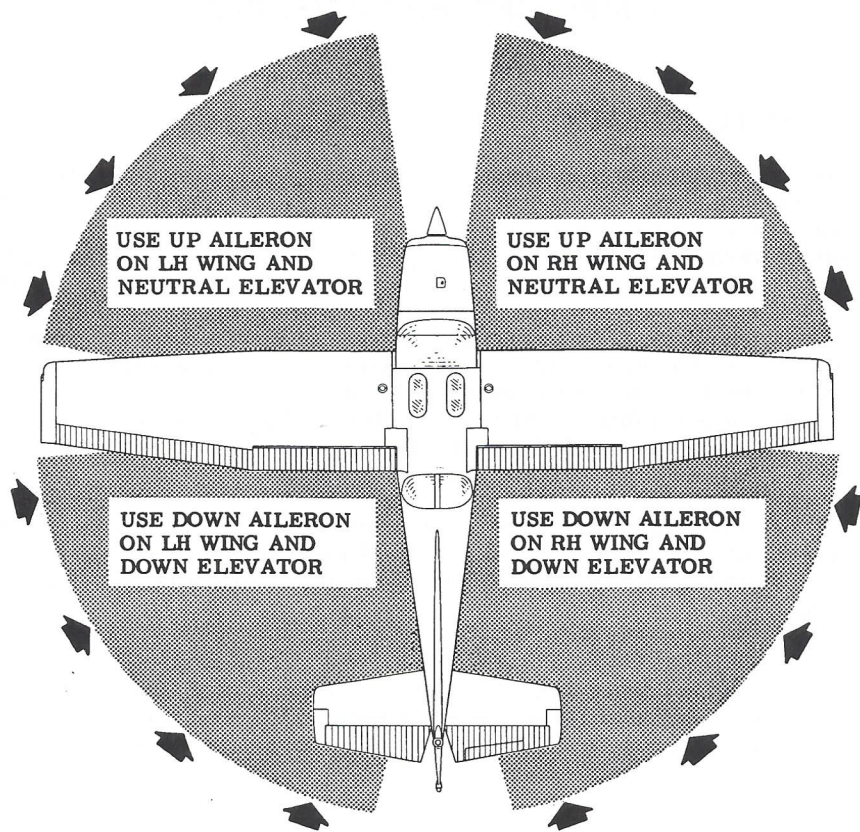
#### NOTE

Additional details concerning cold weather starting and operation may be found under COLD WEATHER OPERATION paragraphs in this section.

### TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (see Taxiing Diagram, figure 4-2) to maintain directional control and balance.

The carburetor heat control knob should be pushed full in during all ground operations unless heat is absolutely necessary. When the knob is



**CODE**

**NOTE**

WIND DIRECTION →

Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude. Use the steerable nose wheel and rudder to maintain direction.

Figure 4-2. Taxiing Diagram

pulled out to the heat position, air entering the engine is not filtered.

Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

## **BEFORE TAKEOFF**

### **WARM-UP**

If the engine accelerates smoothly, the airplane is ready for takeoff. Since the engine is closely cowled for efficient in-flight engine cooling, precautions should be taken to avoid overheating during prolonged engine operation on the ground. Also, long periods of idling may cause fouled spark plugs.

### **MAGNETO CHECK**

The magneto check should be made at 1700 RPM as follows. Move ignition switch first to R position and note RPM. Next move switch back to BOTH to clear the other set of plugs. Then move switch to the L position, note RPM and return the switch to the BOTH position. RPM drop should not exceed 125 RPM on either magneto or show greater than 50 RPM differential between magnetos. If there is a doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists.

An absence of RPM drop may be an indication of faulty grounding of one side of the ignition system or should be cause for suspicion that the magneto timing is set in advance of the setting specified.

### **ALTERNATOR CHECK**

Prior to flights where verification of proper alternator and voltage regulator operation is essential (such as night or instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the optional landing light (if so equipped), or by operating the wing flaps during the engine runup (1700 RPM). The ammeter will remain within a needle width of its initial reading if the alternator and voltage regulator are operating properly.

## **TAKEOFF**

### **POWER CHECK**

It is important to check full-throttle engine operation early in the

takeoff run. Any sign of rough engine operation or sluggish engine acceleration is good cause for discontinuing the takeoff. If this occurs, you are justified in making a thorough full-throttle, static runup before another takeoff is attempted. The engine should run smoothly and turn approximately 2280 to 2400 RPM with carburetor heat off and mixture full rich.

#### NOTE

Carburetor heat should not be used during takeoff unless it is absolutely necessary for obtaining smooth engine acceleration.

Full-throttle runups over loose gravel are especially harmful to propeller tips. When takeoffs must be made over a gravel surface, it is very important that the throttle be advanced slowly. This allows the airplane to start rolling before high RPM is developed, and the gravel will be blown back of the propeller rather than pulled into it. When unavoidable small dents appear in the propeller blades, they should be immediately corrected as described in Section 8 under Propeller Care.

Prior to takeoff from fields above 3000 feet elevation, the mixture should be leaned to give maximum RPM in a full-throttle, static runup.

After full throttle is applied, adjust the throttle friction lock clockwise to prevent the throttle from creeping back from a maximum power position. Similar friction lock adjustments should be made as required in other flight conditions to maintain a fixed throttle setting.

#### WING FLAP SETTINGS

Normal and short field takeoffs are performed with flaps up. Flap settings greater than 10° are not approved for takeoff.

Use of 10° flaps is reserved for minimum ground runs or for takeoff from soft or rough fields. Use of 10° flaps allows safe use of slightly lower takeoff speeds than with flaps up. The lower speeds result in shortening the ground run and total distance over a 50 foot obstacle by approximately 10%. However, this advantage will be lost if flaps up speeds are used, or in high altitude takeoffs in hot weather at maximum weight where climb would be marginal with 10° flaps. Therefore, use of 10° flaps is not recommended for takeoff over an obstacle at high altitude in hot weather.

#### SHORT FIELD TAKEOFF

If an obstruction dictates the use of a steep climb angle, after liftoff

accelerate to and climb out at an obstacle clearance speed of 59 KIAS with flaps retracted. This speed provides the best overall climb speed to clear obstacles when taking into account the turbulence often found near ground level. The takeoff performance data provided in Section 5 is based on the flaps up configuration.

Minimum ground run takeoffs are accomplished using 10° flaps. If 10° of flaps are used on soft or rough fields with obstacles ahead, it is normally preferable to leave them extended rather than retract them in the climb to the obstacle. With 10° flaps, use an obstacle clearance speed of 55 KIAS. As soon as the obstacle is cleared, the flaps may be retracted as the airplane accelerates to the normal flaps-up climb-out speed.

### **CROSSWIND TAKEOFF**

Takeoffs into strong crosswinds normally are performed with the minimum flap setting necessary for the field length to minimize the drift angle immediately after takeoff. The airplane is accelerated to a speed slightly higher than normal, then pulled off abruptly to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

### **ENROUTE CLIMB**

Normal climbs are performed with flaps up and full throttle and at speeds 5 to 10 knots higher than best rate-of-climb speeds for the best combination of performance, visibility and engine cooling. The mixture should be full rich below 3000 feet and may be leaned above 3000 feet for smoother operation or to obtain maximum RPM. For maximum rate of climb, use the best rate-of-climb speeds shown in the Rate-of-Climb chart in Section 5. If an obstruction dictates the use of a steep climb angle, the best angle-of-climb speed should be used with flaps up and maximum power. Climbs at speeds lower than the best rate-of-climb speed should be of short duration to improve engine cooling.

### **CRUISE**

Normal cruising is performed between 55% and 75% power. The engine RPM and corresponding fuel consumption for various altitudes can be deter-

mined by using your Cessna Power Computer or the data in Section 5.

NOTE

Cruising should be done at 65% to 75% power until a total of 50 hours has accumulated or oil consumption has stabilized. This is to ensure proper seating of the rings and is applicable to new engines, and engines in service following cylinder replacement or top overhaul of one or more cylinders.

The Cruise Performance Table, Figure 4-3, illustrates the true air-speed and nautical miles per gallon during cruise for various altitudes and percent power. This table should be used as a guide, along with the available winds aloft information, to determine the most favorable altitude and power setting for a given trip. The selection of cruise altitude on the basis of the most favorable wind conditions and the use of low power settings are significant factors that should be considered on every trip to reduce fuel consumption.

To achieve the recommended lean mixture fuel consumption figures shown in Section 5, the mixture should be leaned until engine RPM peaks and drops 25-50 RPM. At lower powers it may be necessary to enrichen the mixture slightly to obtain smooth operation.

Should it be necessary to cruise at higher than 75% power, the mixture should not be leaned more than is required to provide peak RPM.

Carburetor ice, as evidenced by an unexplained drop in RPM, can be removed by application of full carburetor heat. Upon regaining the original RPM (with heat off), use the minimum amount of heat (by trial and

ALTITUDE	75% POWER		65% POWER		55% POWER	
	KTAS	NMPG	KTAS	NMPG	KTAS	NMPG
Sea Level	114	13.5	107	14.8	100	16.1
4000 Feet	118	14.0	111	15.3	103	16.6
8000 Feet	122	14.5	115	15.8	106	17.1
Standard Conditions					Zero Wind	

Figure 4-3. Cruise Performance Table



error) to prevent ice from forming. Since the heated air causes a richer mixture, readjust the mixture setting when carburetor heat is to be used continuously in cruise flight.

The use of full carburetor heat is recommended during flight in heavy rain to avoid the possibility of engine stoppage due to excessive water ingestion or carburetor ice. The mixture setting should be readjusted for smoothest operation. Power changes should be made cautiously, followed by prompt adjustment of the mixture for smoothest operation.

## STALLS

The stall characteristics are conventional and aural warning is provided by a stall warning horn which sounds between 5 and 10 knots above the stall in all configurations.

Power-off stall speeds at maximum weight for both forward and aft c. g. positions are presented in Section 5.

## SPINS

Intentional spins are approved in this airplane within certain restricted loadings. Spins with baggage loadings or occupied rear seat(s) are not approved.

However, before attempting to perform spins several items should be carefully considered to assure a safe flight. No spins should be attempted without first having received dual instruction both in spin entries and spin recoveries from a qualified instructor who is familiar with the spin characteristics of the Cessna 172N.

The cabin should be clean and all loose equipment (including the microphone and rear seat belts) should be stowed or secured. For a solo flight in which spins will be conducted, the copilot's seat belt and shoulder harness should also be secured. The seat belts and shoulder harnesses should be adjusted to provide proper restraint during all anticipated flight conditions. However, care should be taken to ensure that the pilot can easily reach the flight controls and produce maximum control travels.

It is recommended that, where feasible, entries be accomplished at high enough altitude that recoveries are completed 4000 feet or more above ground level. At least 1000 feet of altitude loss should be allowed for a 1- turn spin and recovery, while a 6- turn spin and recovery may require somewhat more than twice that amount. For example, the recommended entry altitude for a 6- turn spin would be 6000 feet above ground level. In any case, entries should be planned so that recoveries are completed well above the minimum 1500 feet above ground level required by FAR 91.71. Another reason for using high altitudes for practicing spins is that a greater field of view is provided which will assist in maintaining pilot orientation.

The normal entry is made from a power-off stall. As the stall is approached, the elevator control should be smoothly pulled to the full aft position. Just prior to reaching the stall "break", rudder control in the desired direction of the spin rotation should be applied so that full rudder deflection is reached almost simultaneously with reaching full aft elevator. A slightly greater rate of deceleration than for normal stall entries, application of ailerons in the direction of the desired spin, and the use of power at the entry will assure more consistent and positive entries to the spin. As the airplane begins to spin, reduce the power to idle and return the ailerons to neutral. Both elevator and rudder controls should be held full with the spin until the spin recovery is initiated. An inadvertent relaxation of either of these controls could result in the development of a nose-down spiral.

For the purpose of training in spins and spin recoveries, a 1 or 2 turn spin is adequate and should be used. Up to 2 turns, the spin will progress to a fairly rapid rate of rotation and a steep attitude. Application of recovery controls will produce prompt recoveries (within 1/4 turn). During extended spins of two to three turns or more, the spin will tend to change into a spiral, particularly to the right. This will be accompanied by an increase in airspeed and gravity loads on the airplane. If this occurs, recovery should be accomplished quickly by leveling the wings and recovering from the resulting dive.

Regardless of how many turns the spin is held or how it is entered, the following recovery technique should be used:

- (1) VERIFY THAT THROTTLE IS IN IDLE POSITION AND AILERONS ARE NEUTRAL.
- (2) APPLY AND HOLD FULL RUDDER OPPOSITE TO THE DIRECTION OF ROTATION.
- (3) JUST AFTER THE RUDDER REACHES THE STOP, MOVE THE CONTROL WHEEL BRISKLY FORWARD FAR ENOUGH TO BREAK THE STALL.

- (4) HOLD THESE CONTROL INPUTS UNTIL ROTATION STOPS.
- (5) AS ROTATION STOPS, NEUTRALIZE RUDDER, AND MAKE A SMOOTH RECOVERY FROM THE RESULTING DIVE.

#### NOTE

If disorientation precludes a visual determination of the direction of rotation, the symbolic airplane in the turn coordinator or the needle of the turn and bank indicator may be referred to for this information.

Variation in basic airplane rigging or in weight and balance due to installed equipment or right seat occupancy can cause differences in behavior, particularly in extended spins. These differences are normal and will result in variations in the spin characteristics and in the spiraling tendencies for spins of more than 2 turns. However, the recovery technique should always be used and will result in the most expeditious recovery from any spin.

Intentional spins with flaps extended are prohibited, since the high speeds which may occur during recovery are potentially damaging to the flap/wing structure.

## LANDING

### NORMAL LANDING

Normal landing approaches can be made with power-on or power-off with any flap setting desired. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds. Steep slips should be avoided with flap settings greater than 20° due to a slight tendency for the elevator to oscillate under certain combinations of airspeed, sideslip angle, and center of gravity loadings.

#### NOTE

Carburetor heat should be applied prior to any significant reduction or closing of the throttle.

Actual touchdown should be made with power-off and on the main wheels first to reduce the landing speed and subsequent need for braking in the landing roll. The nose wheel is lowered to the runway gently after the speed has diminished to avoid unnecessary nose gear loads. This procedure is especially important in rough or soft field landings.

## SHORT FIELD LANDING

For a short field landing in smooth air conditions, make an approach at the minimum recommended airspeed with full flaps using enough power to control the glide path. (Slightly higher approach speeds should be used under turbulent air conditions.) After all approach obstacles are cleared, progressively reduce power and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made with power off and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply heavy braking as required. For maximum brake effectiveness, retract the flaps, hold the control wheel full back, and apply maximum brake pressure without sliding the tires.

## CROSSWIND LANDING

When landing in a strong crosswind, use the minimum flap setting required for the field length. If flap settings greater than 20° are used in sideslips with full rudder deflection, some elevator oscillation may be felt at normal approach speeds. However, this does not affect control of the airplane. Although the crab or combination method of drift correction may be used, the wing-low method gives the best control. After touchdown, hold a straight course with the steerable nose wheel and occasional braking if necessary.

The maximum allowable crosswind velocity is dependent upon pilot capability as well as aircraft limitations. With average pilot technique, direct crosswinds of 15 knots can be handled with safety.

## BALKED LANDING

In a bailed landing (go-around) climb, reduce the wing flap setting to 20° immediately after full power is applied. If obstacles must be cleared during the go-around climb, reduce the wing flap setting to 10° and maintain a safe airspeed until the obstacles are cleared. Above 3000 feet, lean the mixture to obtain maximum RPM. After clearing any obstacles, the flaps may be retracted as the airplane accelerates to the normal flaps-up climb speed.

## COLD WEATHER OPERATION

### STARTING

Prior to starting on a cold morning, it is advisable to pull the propeller-

ler through several times by hand to "break loose" or "limber" the oil, thus conserving battery energy.

NOTE

When pulling the propeller through by hand, treat it as if the ignition switch is turned on. A loose or broken ground wire on either magneto could cause the engine to fire.

In extremely cold (-18°C and lower) weather, the use of an external pre-heater and an external power source are recommended whenever possible to obtain positive starting and to reduce wear and abuse to the engine and electrical system. Pre-heat will thaw the oil trapped in the oil cooler, which probably will be congealed prior to starting in extremely cold temperatures. When using an external power source, the position of the master switch is important. Refer to Section 7 under Ground Service Plug Receptacle for operating details.

Cold weather starting procedures are as follows:

With Preheat:

(1) With ignition switch OFF and throttle closed, prime the engine four to eight strokes as the propeller is being turned over by hand.

NOTE

Use heavy strokes of primer for best atomization of fuel. After priming, push primer all the way in and turn to locked position to avoid possibility of engine drawing fuel through the primer.

- (2) Propeller Area -- CLEAR.
- (3) Master Switch -- ON.
- (4) Mixture -- FULL RICH.
- (5) Throttle -- OPEN 1/8 INCH.
- (6) Ignition Switch -- START.
- (7) Release ignition switch to BOTH when engine starts.
- (8) Oil Pressure -- CHECK.

Without Preheat:

(1) Prime the engine six to ten strokes while the propeller is being turned by hand with throttle closed. Leave primer charged and ready for stroke.

- (2) Propeller Area -- CLEAR.
- (3) Master Switch -- ON.
- (4) Mixture -- FULL RICH.
- (5) Ignition Switch -- START.
- (6) Pump throttle rapidly to full open twice. Return to 1/8 inch open position.
- (7) Release ignition switch to BOTH when engine starts.
- (8) Continue to prime engine until it is running smoothly, or alternately pump throttle rapidly over first 1/4 of total travel.
- (9) Oil Pressure -- CHECK.
- (10) Pull carburetor heat knob full on after engine has started. Leave on until engine is running smoothly.
- (11) Lock primer.

#### NOTE

If the engine does not start during the first few attempts, or if the engine firing diminishes in strength, it is probable that the spark plugs have been frosted over. Pre-heat must be used before another start is attempted.

#### **CAUTION**

Pumping the throttle may cause raw fuel to accumulate in the intake air duct, creating a fire hazard in the event of a backfire. If this occurs, maintain a cranking action to suck flames into the engine. An outside attendant with a fire extinguisher is advised for cold starts without pre-heat.

During cold weather operations, no indication will be apparent on the oil temperature gage prior to takeoff if outside air temperatures are very cold. After a suitable warm-up period (2 to 5 minutes at 1000 RPM), accelerate the engine several times to higher engine RPM. If the engine accelerates smoothly and the oil pressure remains normal and steady, the airplane is ready for takeoff.

#### FLIGHT OPERATIONS

Takeoff is made normally with carburetor heat off. Avoid excessive leaning in cruise.

Carburetor heat may be used to overcome any occasional engine roughness due to ice.

When operating in temperatures below -18°C, avoid using partial car-

buretor heat. Partial heat may increase the carburetor air temperature to the 0° to 21°C range, where icing is critical under certain atmospheric conditions.

## HOT WEATHER OPERATION

Refer to the general warm temperature starting information under Starting Engine in this section. Avoid prolonged engine operation on the ground.

## NOISE ABATEMENT

Increased emphasis on improving the quality of our environment requires renewed effort on the part of all pilots to minimize the effect of airplane noise on the public.

We, as pilots, can demonstrate our concern for environmental improvement, by application of the following suggested procedures, and thereby tend to build public support for aviation:

- (1) Pilots operating aircraft under VFR over outdoor assemblies of persons, recreational and park areas, and other noise-sensitive areas should make every effort to fly not less than 2,000 feet above the surface, weather permitting, even though flight at a lower level may be consistent with the provisions of government regulations.
- (2) During departure from or approach to an airport, climb after takeoff and descent for landing should be made so as to avoid prolonged flight at low altitude near noise-sensitive areas.

### NOTE

The above recommended procedures do not apply where they would conflict with Air Traffic Control clearances or instructions, or where, in the pilot's judgement, an altitude of less than 2,000 feet is necessary for him to adequately exercise his duty to see and avoid other aircraft.

The certificated noise level for the Model 172N at 2300 pounds maximum weight is 73.8 dB(A). No determination has been made by the Federal Aviation Administration that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out of, any airport.